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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,971	11/14/2001	Koichi Tanaka	09792909-5272	6785

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EXAMINER	
RUTHKOSKY, MARK	
ART UNIT	**PAPER NUMBER**
1745	

DATE MAILED: 02/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/992,971	TANAKA, KOICHI	
	Examiner	Art Unit	
	Mark Ruthkosky	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The amendment submitted 11/17/2005 has been entered into the application file. Support for the amendment is found on page 21 of the instant specification.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With regard to applicant's amendment that the fuel source made from carbon-based fluorine molecules, carbon nanotubes, or carbon nanofibers, the fuel source is taught in the reference to come from carbon nanotubes and carbon nanofibers. The fuel is not disclosed to be "*made from* carbon-based fluorine molecules, carbon nanotubes, or carbon nanofibers."

Claim 3 is rejected, as it is not clear how the claim further limits the independent claim from which it depends. Elements of the Markush group appear to be the same elements defined in claim 1.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. With regard to applicant's amendment that the fuel source made from carbon-based fluorine molecules, carbon nanotubes, or carbon nanofibers, the fuel source is taught in the reference to come from carbon nanotubes and carbon nanofibers. The fuel is not disclosed to be "*made from* carbon-based fluorine molecules, carbon nanotubes, or carbon nanofibers."

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

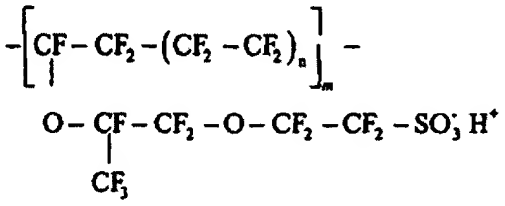
Claims 15-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Kelley et al. (US 6,080,501.)

The instant claims are to an electrochemical device comprising a fuel electrode which becomes a negative electrode while accompanying the generation of hydrogen; an oxygen electrode provided in contact with oxygen which becomes a positive electrode while

accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons; an ion-exchange membrane for conducting the hydrogen ions in the fuel electrode into the oxygen electrode, the ion-exchange membrane having a proton conductor comprising a polymer material; and a fuel source for supplying a fuel so as to generate the hydrogen ions in the fuel electrode; the fuel electrode and the fuel source constitute a fuel electrode assembly in a state being in contact with each other; the fuel electrode assembly is surrounded by the ion-exchange membrane in a state being in contact with the ion exchange membrane; and the ion-exchange membrane is surrounded by the oxygen electrode in a state being in contact with the oxygen electrode. The ion exchange membrane further comprises a carbon cluster derivative including a plurality of functional groups capable of transferring a plurality of protons between each of the functional groups of the carbon cluster derivative.

Kelley et al. (US 6,080,501) teaches an electrochemical device comprising a fuel electrode which becomes a negative electrode while accompanying the generation of hydrogen; an oxygen electrode provided in contact with oxygen which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons; an ion-exchange membrane for conducting the hydrogen ions in the fuel electrode into the oxygen electrode, the ion-exchange membrane having a proton conductor; and a fuel source for supplying a fuel so as to generate the hydrogen ions in the fuel electrode; wherein the fuel electrode and the fuel source constitute a fuel electrode assembly in a state being in contact with each other. The proton conductor is a solid polymer electrolyte material that is ion-permeable. The material includes a porous portion and inorganic, sulfur ionic groups attached to the membrane to transfer charge. The ion exchange membrane include polystyrene polymers

substituted with perfluorinated sulfonic acid groups, inorganic polymers and Nafion (col. 3, lines 35-50.) These materials comprise a carbon cluster polymer derivative including a plurality of SO_3H groups that transfer protons between the functional groups of the carbon cluster derivative.



Nafion

The fuel source includes metal hydride materials and carbon nanotubes (col. 4, lines 1-45.) The materials are contained in a housing and are electrically connected through the inter medium (col. 4, lines 30-60.) The housing has oxidant passages for electrode reactivity (figures.) With regard to claims 21 and 22, MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." The material includes carbon chains in the membrane. Thus, the claims are anticipated.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-14 and 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley et al. (US 6,080,501), and further in view of Bass et al. (US 6,001,500.)

Kelley et al. (US 6,080,501) teaches an electrochemical device comprising a fuel electrode which becomes a negative electrode while accompanying the generation of hydrogen; an oxygen electrode provided in contact with oxygen which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons; an ion-exchange membrane for conducting the hydrogen ions in the fuel electrode into the oxygen electrode, the ion-exchange membrane having a proton conductor; and a fuel source for supplying a fuel so as to generate the hydrogen ions in the fuel electrode; wherein the fuel electrode and the fuel source constitute a fuel electrode assembly in a state being in contact with each other. The anode and cathode are composed of a conductive cloth or fiber paper coated with a noble metal such as platinum (col. 3, lines 25-50.) The proton conductor is a solid polymer electrolyte material that is ion-permeable. The material includes a porous portion and inorganic, sulfur ionic groups attached to the membrane to transfer charge. The ion exchange membrane is polystyrene polymers substituted with perfluorinated sulfonic acid groups, inorganic polymers and Nafion (col. 3, lines 35-50.) These materials comprise a carbon cluster polymer derivative including a plurality of SO_3H groups that transfer protons between the functional groups of the carbon cluster derivative.

$$-\left[\begin{array}{c}CF-CF_2-(CF_2-CF_2)_n\\ |\\ O-CF-CF_2-O-CF_2-CF_2-SO_3^-H^+\\ |\\ CF_3\end{array}\right]_m-$$

Nafion

The fuel source includes metal hydride materials, carbon nanofibers and carbon nanotubes (col. 4, lines 1-45.) The materials are contained in a housing and are electrically connected through the inter medium (col. 4, lines 30-60.) The housing has oxidant passages for electrode reactivity (figures.)

The reference does not teach a fuel electrode assembly surrounded by the ion-exchange membrane in a state being in contact with the ion exchange membrane and the ion-exchange membrane surrounded by the oxygen electrode in a state being in contact with the oxygen electrode. Bass et al. (US 6,001,500), however, teaches an electrochemical device comprising a fuel electrode which becomes a negative electrode while accompanying the generation of hydrogen; an oxygen electrode provided in contact with oxygen which becomes a positive electrode while accompanying generation of water from oxygen molecules, the hydrogen ions, and electrons; an ion-exchange membrane for conducting the hydrogen ions in the fuel electrode into the oxygen electrode, the ion-exchange membrane having a proton conductor; and a fuel source for supplying a fuel so as to generate the hydrogen ions in the fuel electrode. The fuel electrode assembly surrounded by the ion-exchange membrane in a state being in contact with the ion exchange membrane and the ion-exchange membrane surrounded by the oxygen electrode in a state being in contact with the oxygen electrode. The fuel electrode includes a carbon particle supported platinum catalyst layer (col. 2, line40- col. 3, line 60.) The catalyst includes a proton conductor in the layer. Nafion is taught as a proton conductor with proton dissociative groups in a carbonaceous material containing carbon as a main component. It would be obvious to one of ordinary skill in the art at the time the invention was made to use an

electrode structure with the anode on the inner surface of the cylinder and the cathode on the outer surface of the cylinder, as taught in Bass, in a fuel cell as taught by Kelley, as this configuration will allow for an equivalent means catalyzing the fuel and oxidant reactions in a fuel cell and providing electrical current from the fuel cell. As the anode requires the fuel source, one of ordinary skill in the art would be motivate to include the fuel source on the inner surface of the fuel cell in order to react the fuel at the anode. The order of the anode and electrode would provide the equivalent fuel cell and one of ordinary skill in the art would recognize that the order of the electrodes would be couples with the electrodes appropriate reactant.

With regard to claim 5, the reference does not teach the fuel source formed into a round column. As noted in the rejection, it would be obvious to one of ordinary skill in the art at the time the invention was made to use an electrode structure with the anode on the inner surface of the cylinder and the cathode on the outer surface of the cylinder as taught in Bass. As the anode requires the fuel source, one of ordinary skill in the art would be motivate to include the fuel source on the inner surface of the fuel cell in order to react the fuel at the anode. In both references, the shape of the inner surface is cylindrical and therefore the shape of the fuel source on the interior would be a round column shape.

With regard to applicant's amendment that the fuel source made from carbon-based fluorine molecules, carbon nanotubes, or carbon nanofibers, the fuel source is taught in the reference to come from carbon nanotubes and carbon nanofibers in the same manner as disclosed in the instant specification.

With regard to the claims, MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." The material includes carbon chains in the membrane.

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kelley et al. (US 6,080,501), in view of Bass et al. (US 6,001,500,) as presented in the previous section, and further in view of Hinokuma et al. (US 6,495,290.)

The teachings of Kelley et al. (US 6,080,501) and Bass et al. (US 6,001,500) have been presented. With regard to the fuel cell catalyst, the fuel electrode includes a carbon particle supported platinum catalyst layer (Bass, col. 2, line40- col. 3, line 60.) The catalyst includes a proton conductor in the layer. Nafion is taught as a proton conductor with proton dissociative groups in a carbonaceous material containing carbon as a main component. Neither Kelley et al. (US 6,080,501) nor Bass et al. (US 6,001,500) teach that the proton conductor comprises a fullerene derivative. Hinokuma et al. (US 6,495,290), however, teaches a fullerene derivative as a proton conductor with proton dissociative groups in a carbonaceous material containing carbon as a main component. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the fullerene derivative of Hinokuma as the proton conductor in the Kelley et al. and Bass fuel cells as Hinokuma teaches that the fullerene proton conductor achieves an electrochemical device having increased thermal, increased strength and chemical

stability while permitting the conduction of protons as taught in the fuel cells of the cited references (abstract, for example.) The artesian would have found the claimed invention to be obvious in light of the teachings of the references.

Response to Arguments

Applicant's arguments filed 11/17/2005 have been fully considered but they are not persuasive. The applicant argues that independent claim 1, as amended, requires a fuel source made from carbon-based fluorine molecules, carbon nanotubes, or carbon nanofibers. The applicant argues that the cited references do not teach this limitation in the inventions of the prior art. The examiner disagrees with the applicant's argument. Kelley et al. (US 6,080,501) teaches an electrochemical device comprising a fuel source includes metal hydride materials, carbon nanofibers and carbon nanotubes (col. 4, lines 1-45.) With regard to applicant's amendment that the fuel source made from carbon-based fluorine molecules, carbon nanotubes, or carbon nanofibers, the fuel source is taught in the reference to be released from carbon nanotubes and carbon nanofibers in the same manner as disclosed in the instant specification. Thus, the claims stand rejected.

With regard to claims 12-28, the claims have not been amended to correspond with applicant's arguments and no further arguments are presented. These claims stand rejected for reasons of record.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free.)

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745